MLDP In-Band Signaling/Transit Mode

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This module contains information for configuring Multicast Label Distribution Protocol (MLDP) in-band signaling to enable the MLDP core to create (S,G) or (*,G) state without using out-of-band signaling such as Border Gateway protocol (BGP) or Protocol Independent Multicast (PIM).

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table at the end of this module.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Restrictions for MLDP In-Band Signaling

- MLDP in-band signaling supports SOURCE-SPECIFIC MULTICAST (SSM) multicast traffic only.
- MLDP in-band signaling is not supported in the same VRF for which Rosen Model MLDP-based MVPN or GRE-based MVPN is configured.

Information About MLDP In-Band Signaling/Transit Mode

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MLDP In-Band Signaling/Transit Mode

Multicast Label Distribution Protocol (MLDP)-supported multicast VPN (MVPN) allows VPN multicast streams to be aggregated over a VPN-specific tree. No customer state is created in the MLDP core;, there is only state for default and data multicast distribution trees (MDTs). In certain scenarios, the state created for VPN streams is limited and does not appear to be a risk or limiting factor. In these scenarios, MLDP can build in-band MDTs that are transit Label Switched Paths (LSPs).

Trees used in a VPN space are MDTs. Trees used in the global table are transit point-to-multipoint (P2MP) or multipoint-to-multipoint (MP2MP) LSPs. In both cases, a single multicast stream (VPN or not) is associated with a single LSP in the MPLS core. The stream information is encoded in the Forwarding Equivalence Class (FEC) of the LSP. This is in-band signaling.

MLDP in-band signaling uses access control lists (ACLs) with the range of the multicast (S, G) to be transported by the MLDP LSP. Each multicast channel (S, G) maps, one-to-one, to each tree in the in-band tree. The (S,G) join is registered in the Multicast Routing Information Base (MRIB), which is a client of MLDP. Each MLDP LSP is identified by the FEC of [(S,G) + RD], where RD is the Route Distinquisher (RD) obtained from BGP. This differs from MLDP-based MVPN, where the identity is in a FEC of [MDT #, VPN ID, Tree #]).

The ingress Provider Edge (PE) device uses the FEC to decode the stream information and associate the multicast stream with the LSP (in the FEC). This service model is only applicable for transporting Protocol Independent Multicast (PIM) source-specific multicast (SSM) traffic. There is no need to run PIM over the LSP because the stream signaling is done in-band.

The MLDP In-Band Signaling/Transit Mode feature is supported on IPv4 and IPv6 networks. MLDP in-band signaling and MLDP-based MVPN cannot be supported in the same VRF.

How to Configure MLDP In-Band Signaling/Transit Mode

Enabling In-Band Signaling on a PE Device

- VRF instances for in-band signaling must be configured.
- Access control lists (ACLs) for controlling streams must be configured.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. Use one of the following commands:
   - **ip multicast** [**vrf** *vrf*] **mpls mldp** [**range** *acl*]
   - **ipv6 multicast** [**vrf** *vrf*] **mpls mldp**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.

Step 3	Use one of the following commands:
	• **ip multicast** [**vrf** *vrf*] **mpls mldp** [**range** *acl*]
	• **ipv6 multicast** [**vrf** *vrf*] **mpls mldp**
	
	Example:
	`Device (config)# ip multicast vrf vrf1 mpls mldp`
	
	`Device (config)# ipv6 multicast vrf vrf1 mpls mldp`
		Brings up the MLDP MRIB process and registers MLDP with the MRIB.
		• To enable in-band signaling globally, use this command without the **vrf** *vrf* keyword and argument combination.
		• IPv4 only: To identify streams for in-band signaling, use this command with the **range** keyword on the egress PE.

Additional References

Related Documents

Related Topic	Document Title
IPv6 addressing and connectivity	*IPv6 Configuration Guide*
Cisco IOS commands	*Cisco IOS Master Commands List, All Releases*
IP multicast commands	*Cisco IOS IP Multicast Command Reference*
IPv6 commands	*Cisco IOS IPv6 Command Reference*
Cisco IOS IPv6 features	*Cisco IOS IPv6 Feature Mapping*

Standards and RFCs

Standard/RFC	Title
RFCs for IPv6	*IPv6 RFCs*

MIBs

MIB	MIBs Link
	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Configuration Examples for MLDP In-Band Signaling/Transit Mode

Example: In-Band Signaling on PE1

```
PE1# show running-config
Building configuration...

Current configuration : 8247 bytes
!
! Last configuration change at 12:44:13 IST Thu Nov 15 2012
!

hostname PE1
!
mls ipv6 vrf
!
vrf definition vrf1
 rd 1:1
 vpn id 1:1
 route-target export 1:1
```

```
 route-target import 1:1
 !
 address-family ipv4
  route-target export 1:1
  route-target import 1:1
 exit-address-family
 !
 address-family ipv6
  route-target export 1:1
  route-target import 1:1
 exit-address-family
!

ip multicast-routing
ip multicast-routing vrf vrf1
ip multicast hardware-switching replication-mode egress
ip multicast mpls mldp
ip multicast vrf vrf1 mpls mldp
!
!
!
ipv6 unicast-routing
ipv6 multicast-routing
ipv6 multicast-routing vrf vrf1
ipv6 multicast rpf use-bgp
ipv6 multicast mpls source Loopback0
ipv6 multicast mpls mldp
ipv6 multicast vrf vrf1 rpf use-bgp
ipv6 multicast vrf vrf1 mpls source Loopback0
ipv6 multicast vrf vrf1 mpls mldp
!
!
vtp domain cisco
vtp mode off
mpls label protocol ldp
mpls ldp graceful-restart
mls flow ip interface-full
no mls flow ipv6
mls rate-limit multicast ipv4 igmp 100 10
mls cef error action reset
mls mpls tunnel-recir
multilink bundle-name authenticated
!
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
no diagnostic bootup level
!
redundancy
 main-cpu
  auto-sync running-config
 mode sso
!

vlan internal allocation policy ascending
vlan access-log ratelimit 2000
!
interface Loopback0
 ip address 1.1.1.1 255.255.255.255
 ip pim sparse-mode
 ip ospf 100 area 0
 ipv6 address 1::1:1:1/64
 ipv6 enable
!
.
.
.
!
interface GigabitEthernet2/0/0.1
 encapsulation dot1Q 2
 vrf forwarding vrf1
```

```
 ip address 192.0.2.1 255.255.255.0
 ip pim sparse-mode
 ip igmp version 3
 ipv6 address FE80::10:1:1 link-local
 ipv6 address 2001:DB8::/64
 ipv6 enable
!
interface GigabitEthernet2/0/0.2000
 encapsulation dot1Q 2000
 ip address 192.0.2.2 255.255.255.0
 ip pim sparse-mode
 ip igmp version 3
 ipv6 address 2001:DB8:0:1/64
 ipv6 enable
!
.
.
.
interface GigabitEthernet2/0/12
 ip address 192.0.2.3 255.255.255.0
 ip pim sparse-mode
 ip ospf 100 area 0
 ipv6 address 2001:DB8::/64
 ipv6 enable
 mpls ip
 mpls label protocol ldp
 no mls qos trust
!
!
!
router ospf 100
 router-id 1.1.1.1
!
router bgp 100
 bgp log-neighbor-changes
 neighbor 2.2.2.2 remote-as 100
 neighbor 2.2.2.2 update-source Loopback0
 neighbor 3.3.3.3 remote-as 100
 neighbor 3.3.3.3 update-source Loopback0
 neighbor 4.4.4.4 remote-as 100
 neighbor 4.4.4.4 update-source Loopback0
 !
 address-family ipv4
  redistribute static
  redistribute connected
  neighbor 2.2.2.2 activate
  neighbor 2.2.2.2 send-community both
  neighbor 3.3.3.3 activate
  neighbor 3.3.3.3 send-community both
  neighbor 4.4.4.4 activate
  neighbor 4.4.4.4 send-community both
 exit-address-family
 !
 address-family vpnv4
  neighbor 2.2.2.2 activate
  neighbor 2.2.2.2 send-community extended
  neighbor 3.3.3.3 activate
  neighbor 3.3.3.3 send-community extended
  neighbor 4.4.4.4 activate
  neighbor 4.4.4.4 send-community extended
 exit-address-family
 !
 address-family ipv4 mdt
  neighbor 2.2.2.2 activate
  neighbor 2.2.2.2 send-community extended
  neighbor 3.3.3.3 activate
  neighbor 3.3.3.3 send-community extended
  neighbor 4.4.4.4 activate
  neighbor 4.4.4.4 send-community extended
 exit-address-family
 !
 address-family ipv6
  redistribute connected
```

```
  neighbor 2.2.2.2 activate
  neighbor 2.2.2.2 send-community extended
  neighbor 2.2.2.2 send-label
  neighbor 3.3.3.3 activate
  neighbor 3.3.3.3 send-community extended
  neighbor 3.3.3.3 send-label
  neighbor 4.4.4.4 activate
  neighbor 4.4.4.4 send-community extended
  neighbor 4.4.4.4 send-label
 exit-address-family
 !
 address-family vpnv6
  neighbor 2.2.2.2 activate
  neighbor 2.2.2.2 send-community extended
  neighbor 3.3.3.3 activate
  neighbor 3.3.3.3 send-community extended
  neighbor 4.4.4.4 activate
  neighbor 4.4.4.4 send-community extended
 exit-address-family
 !
 address-family ipv4 vrf vrf1
  redistribute connected
 exit-address-family
 !
 address-family ipv6 vrf vrf1
  redistribute connected
 exit-address-family
!
no ip forward-protocol nd
!
no ip http server
no ip http secure-server
ip pim ssm default
ip pim mpls source Loopback0
ip pim vrf vrf1 ssm default
ip pim vrf vrf1 mpls source Loopback0
ip route 192.0.2.25 255.255.255.255 7.37.0.1
!
!
mpls ldp router-id Loopback0 force
!
!
!
end
```

Example: In-Band Signaling on PE2

```
PE2# show running-config
Building configuration...

Current configuration : 7609 bytes
!
! Last configuration change at 13:18:45 IST Thu Nov 15 2012
!
hostname PE2
!
mls ipv6 vrf
!
vrf definition vrf1
 rd 1:1
 vpn id 1:1
 route-target export 1:1
 route-target import 1:1
 !
 address-family ipv4
  route-target export 1:1
  route-target import 1:1
 exit-address-family
 !
 address-family ipv6
  route-target export 1:1
  route-target import 1:1
```

```
 exit-address-family
!
.
.
.
!
ip multicast-routing
ip multicast-routing vrf vrf1
ip multicast hardware-switching replication-mode egress
ip multicast mpls mldp
ip multicast vrf vrf1 mpls mldp
!
!
!
ipv6 unicast-routing
ipv6 multicast-routing
ipv6 multicast-routing vrf vrf1
ipv6 multicast rpf use-bgp
ipv6 multicast mpls source Loopback0
ipv6 multicast mpls mldp
ipv6 multicast vrf vrf1 rpf use-bgp
ipv6 multicast vrf vrf1 mpls source Loopback0
ipv6 multicast vrf vrf1 mpls mldp
!
!
vtp domain isbu-devtest
vtp mode off
mpls label protocol ldp
mpls ldp graceful-restart
mls flow ip interface-full
no mls flow ipv6
mls cef error action reset
multilink bundle-name authenticated
!
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
diagnostic bootup level minimal
!
redundancy
 main-cpu
  auto-sync running-config
 mode sso
!
!
!
interface Loopback0
 ip address 4.4.4.4 255.255.255.255
 ip pim sparse-mode
 ip ospf 100 area 0
 ipv6 enable
!
.
.
.
!
interface GigabitEthernet3/0/3.1
 encapsulation dot1Q 2
 vrf forwarding vrf1
 ip address 192.0.2.1 255.255.255.0
 ip pim sparse-mode
 ip igmp version 3
 ipv6 address FE80::30:1:1 link-local
 ipv6 address 2001:DB8::/64
 ipv6 enable
!
interface GigabitEthernet3/0/3.2000
 encapsulation dot1Q 2000
 ip address 192.0.2.2 255.255.255.0
 ip pim sparse-mode
 ip igmp static-group 232.1.1.1 source 50.0.0.2
```

```
 ip igmp version 3
 ipv6 address 2001:DB8:0:1/64
 ipv6 enable
!
.
.
.
!
interface GigabitEthernet4/15
 ip address 192.0.2.3 255.255.255.0
 ip pim sparse-mode
 ip ospf 100 area 0
 ipv6 address 2001:DB8::/64
 ipv6 enable
 mpls ip
 mpls label protocol ldp
!
.
.
.
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 100
 router-id 4.4.4.4
!
router bgp 100
 bgp log-neighbor-changes
 neighbor 1.1.1.1 remote-as 100
 neighbor 1.1.1.1 update-source Loopback0
 neighbor 2.2.2.2 remote-as 100
 neighbor 2.2.2.2 update-source Loopback0
 neighbor 3.3.3.3 remote-as 100
 neighbor 3.3.3.3 update-source Loopback0
 !
 address-family ipv4
  redistribute static
  redistribute connected
  neighbor 1.1.1.1 activate
  neighbor 1.1.1.1 send-community both
  neighbor 2.2.2.2 activate
  neighbor 2.2.2.2 send-community both
  neighbor 3.3.3.3 activate
  neighbor 3.3.3.3 send-community both
 exit-address-family
 !
 address-family vpnv4
  neighbor 1.1.1.1 activate
  neighbor 1.1.1.1 send-community extended
  neighbor 2.2.2.2 activate
  neighbor 2.2.2.2 send-community extended
  neighbor 3.3.3.3 activate
  neighbor 3.3.3.3 send-community extended
 exit-address-family
 !
 address-family ipv4 mdt
  neighbor 1.1.1.1 activate
  neighbor 1.1.1.1 send-community extended
  neighbor 2.2.2.2 activate
  neighbor 2.2.2.2 send-community extended
  neighbor 3.3.3.3 activate
  neighbor 3.3.3.3 send-community extended
 exit-address-family
 !
 address-family ipv6
  redistribute connected
  neighbor 1.1.1.1 activate
  neighbor 1.1.1.1 send-community extended
  neighbor 1.1.1.1 send-label
  neighbor 2.2.2.2 activate
  neighbor 2.2.2.2 send-community extended
```

```
  neighbor 2.2.2.2 send-label
  neighbor 3.3.3.3 activate
  neighbor 3.3.3.3 send-community extended
  neighbor 3.3.3.3 send-label
 exit-address-family
 !
 address-family vpnv6
  neighbor 1.1.1.1 activate
  neighbor 1.1.1.1 send-community extended
  neighbor 2.2.2.2 activate
  neighbor 2.2.2.2 send-community extended
  neighbor 3.3.3.3 activate
  neighbor 3.3.3.3 send-community extended
 exit-address-family
 !
 address-family ipv4 vrf vrf1
  redistribute connected
 exit-address-family
 !
 address-family ipv6 vrf vrf1
  redistribute connected
 exit-address-family
!
ip forward-protocol nd
!
no ip http server
no ip http secure-server
ip pim ssm default
ip pim mpls source Loopback0
ip pim vrf vrf1 ssm default
ip pim vrf vrf1 mpls source Loopback0
ip route 192.0.2.25 255.255.255.255 7.37.0.1
!
!
mpls ldp router-id Loopback0 force
!
!
.
.
.
!
!
end
```

Feature Information for MLDP In-Band Signaling/Transit Mode

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Table 1 Feature Information for MLDP In-Band Signaling/Transit Mode

Feature Name	Releases	Feature Information
MLDP In-Band Signaling/Transit Mode	15.3(1)S Cisco IOS XE 3.8S	Multicast Label Distribution Protocol (MLDP) in-band signaling supports point-to-multipoint (P2P) and multipoint-to-multipoint (MP2MP) Label Switched Paths (LSPs) and enables the MLDP core to create (S,G) or (*,G) state without using out-of-band signaling such as Border Gateway Protocol (BGP) or Protocol Independent Multicast (PIM). This feature is supported for IPv4 and IPv6 multicast groups. The following commands were introduced or modified: **ip multicast mpls mldp**, **ipv6 multicast mpls mldp**.